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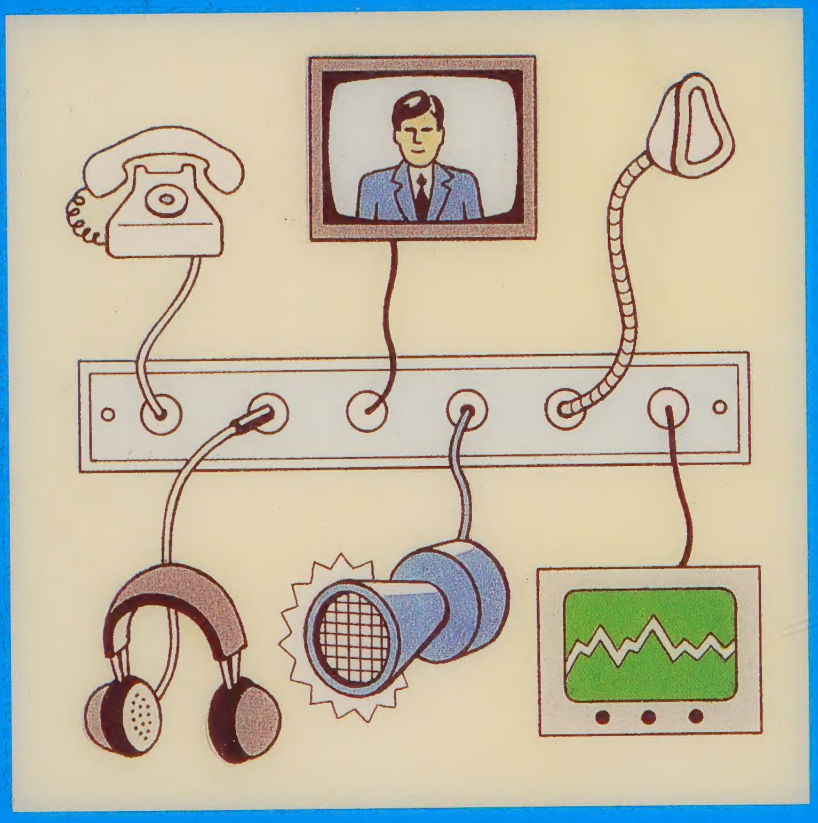
Health Technical Memorandum 2015

Validation and verification
Operational management

Bedhead services



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Operational management

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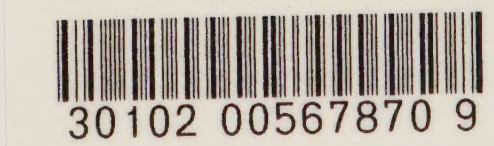

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An Executive Agency of the Department of Health

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About this publication

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.

They are applicable to new and existing sites, and are for use at various stages during the inception, design, construction, refurbishment and maintenance of a building.

Health Technical Memorandum 2015

HTM 2015 (Bedhead services) focuses on:

- the legal, mandatory and functional requirements;
- design applications;
- maintenance and operation of systems

of electrical, communications and medical gases terminal units required at the bedhead and at other patient locations in all types of healthcare premises.

It is published in three separate volumes, each addressing a specialist discipline:

- **Management policy** – outlines the overall responsibility of managers of healthcare premises and details their legal and mandatory obligations in providing adequate electrical/ communications, gas and vacuum supply facilities for patients. It summarises the technical aspects involved and concludes with a list of definitions;

- this volume comprises two distinct sections:

  Validation and verification – details the requirements for ensuring that manufactured equipment is formally tested and certified as to contract and manufactured to the highest level of quality assurance. The importance of commissioning and site testing is emphasised and the systems listed;

Operational management – provides guidance for those responsible for overseeing and operating day-to-day running and maintenance. Coverage includes voltage supplies, instruments, quality of radio/ television (TV) reception and alarm system function. Record-keeping is also discussed;

- **Design considerations** – highlights the overall requirements and considerations that should be applied to the design up to the contract document.

Guidance in this Health Technical Memorandum is complemented by the library of National Health Service Model Engineering Specifications. Users of the guidance are advised to refer to the relevant specifications for:

a. medical gases;

b. common services electrical (low and extra low);

c. nurse call systems.

The contents of this Health Technical Memorandum in terms of management policy, operational policy and technical guidance are endorsed by:

- the Welsh Office for the NHS in Wales;
- the Health and Personal Social Services Management Executive in Northern Ireland;
- the National Health Service in Scotland Management Executive;

and set the required standards consistent with Departmental Cost Allowance Guides.

References to legislation appearing in the main text of this document apply in England and Wales. Where references differ for Scotland and/or Northern Ireland, these are given as marginal notes.

Where appropriate, marginal notes are also used to amplify the text.

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1.0 Scope

The importance of achieving correct maintenance/service for complex equipment cannot be overstressed. Unless the management has complete confidence in the ability of the engineering staff to carry out adequate repairs and preventative maintenance, those functions should be assigned to the manufacturer, supplier or other qualified and competent agent.

1.1 Healthcare premises (HCP) will achieve maximum efficiency when patients receive quality treatment appropriate to their needs with the minimum length of stay. To this end the services provided at the point of nursing, that is, at the bedhead, should be tailored to meet not only the short-term requirements but also the longer-term.

1.2 The guidance in this HTM applies primarily to new healthcare premises and major refurbishment work; however, the principles also apply to alterations and extensions to existing installations. It covers bedhead services, and in particular patient-to-nurse call systems. The various types of installation to be considered are described.

1.3 The degree of sophistication will vary greatly over the range between low dependency areas such as geriatric assessment, and high dependency such as intensive care wards.

1.4 The degree of engineering necessary to provide the nominated services will be influenced by the building structure. Supporting equipment in lightweight walling consisting of composite partitioning will require a totally different approach to established solid walling with possible deep window recesses.

Refer to HTM 2014 – 'Abatement of electrical interference'.

1.5 As electronic systems become more sophisticated, the importance of electromagnetic compatibility (EMC) needs to be recognised. This includes the potential problems with electrostatic discharges (ESD) derived from the high static voltages that can be generated at the bedside.

2.0 VALIDATION AND VERIFICATION

Works testing

2.1 Each item of electrical bedhead services equipment should be tested to an approved test specification, that is, BS, IEC, ISO etc.

2.2 Each item tested should bear an identification mark to validate correct functioning.

2.3 Following testing, sensitive plug-in electronic modules should be wrapped in antistatic material. Where it is advisable to restrict the handling of the sensitive electronic modules to the commissioning engineer, the modules should be packed separately to the equipment and identified as sensitive material for installing by the commissioning engineer only. It may be necessary to label such packages, warning of invalidation of the guarantee if unauthorised opening takes place.

The term "engineer" refers to the person appointed to test and commission the bedhead services equipment and systems by the manufacturer or their agent.

2.4 All equipment delivered to site should be stored in a warm and dry environment.

Site testing and commissioning

General

2.5 It is strongly recommended that the testing and commissioning of the extra low voltage bedhead services equipment and systems be undertaken by the manufacturer or their agent.

2.6 The engineer should avail him/herself of all necessary documentation prior to testing, as follows:

a. wiring diagrams;

b. equipment circuit diagrams;

c. checklist covering all items of equipment in the contract;

d. product service manual;

e. commissioning certificate;

f. software programming details when appropriate.

2.7 The engineer should be equipped with all necessary test gear and instrumentation sufficient to complete the works and demonstrate satisfactorily the correct working of the system to the client or their representative.

2.8 Equipment to be fitted at time of testing and which has been stored on site should be examined for damage or dampness prior to fitting.

2.9 Equipment such as sensitive electronic modules which has been wrapped in protective material and sealed should be intact when handed to the engineer. Where such packaging is disturbed and there is a chance of the contents being damaged, the engineer will take steps to have the equipment replaced and, if appropriate, advise the client of any penalties that may result.

2.10 Where a supplier advocates the use of cables, coloured to a standard range, to facilitate colour-to-colour connections to equipment terminations and these are detailed on the wiring diagram, it is essential that the installer complies accordingly.

2.11 The use of a single colour or alternative colour cables necessitating identifying tabs or sleeves is not recommended. Such markers can be lost or cut off during the connecting process.

2.12 The engineer should check that the correct type of cable has been installed and that the standard of connection is satisfactory.

2.13 Where data or telephone-type cables have been installed and terminations are in the form of insulation displacement terminations (IDT) it should be confirmed that an approved tool has been used. The use of other than an approved tool will give rise to doubtful connections, especially where more than one conductor is located in a single terminal.

2.14 Before any electronic modules are fitted, such tests as are required by the supplier to be applied to the cabling should be carried out using any standard or specialised test gear recommended or provided.

2.15 The engineer should be fully aware of the need to handle static sensitive modules correctly. The use of an earthed wrist strap at all times when handling is essential.

Communications

2.16 The power supply unit for the ELV communication systems should be supplied from the essential LV supply via a switched fuse unit. On energising the power supply unit a check should be made on the LV volts applied and the d.c. output volts at no load.

2.17 Each bedhead panel should be tested in turn to check that all facilities are functioning correctly. This test requires that all handsets and call only units for the entire system be plugged in.

2.18 All other items of communications equipment should be examined to confirm correct working both as individual items and also in their relationship to other connected units.

2.19 Where speech systems are installed the engineer should carry out the necessary speech quality testing with a second operator.

2.20 All items when tested should be ticked off on the checklist.

2.21 A patient/nurse call system should be 25% load tested. A series of calls should be instigated until 25% of the total number of calling points have been activated. At this stage:

a. any other call point on the system should be able to make a call;

b. any emergency staff/staff call should function;

c. any bedlight control circuit utilising the call system ELV should operate;

d. all entertainment channels should be present and controllable;

e. the d.c. voltage at the most distant point from the power supply should not be less than the supplier's recommendation.

2.22 Where bedlights are controlled by a relay which is powered from the call system ELV and which remains energised during the period when the lamp is illuminated (that is, not a mechanically latching impulse relay), all bedlights associated with the system should be switched on and the tests detailed in paragraph 2.21 carried out.

2.23 Tone sounder units should be checked for adequate loudness and correct mode of operation depending upon type of call being tested. Tone sounders, which should be controlled by a night quieting switch, should be checked under both loud and quiet settings of the switch.

2.24 Plug-in call units such as handsets and call only units should each be unplugged to confirm that this raises a call. Re-insertion of the plug should enable that call to be reset.

Entertainment

2.25 All installed programme sources should be checked for correct working and adequate output levels which are balanced and sufficient to drive the total load as presented by the bedhead services equipment and any other load such as may be installed in workshops, laundry, dayrooms etc.

2.26 At maximum power output into the maximum load an audible test should reveal no perceptible distortion. A well-designed system should have a total harmonic distortion of not more than 2% at 1 kHz. Crosstalk between channels should not exceed minus 45 dB.

2.27 Any aerials provided for radio and television tuners should be tested for adequate signal strength using an appropriate signal strength meter. Where any doubt exists, the engineer should check with the installer that the directional orientation of the aerials is optimum for the particular area and for the programmes required by the client.

2.28 Where programme distribution is achieved by using multi-paired cable with one pair allocated to each channel, the amount of cable and the number of connections can become very considerable, especially for a large site. It is essential that the cabling network is thoroughly checked to ensure that there are no short circuits, open circuits or cross-connections.

Once connected to equipment, the presence of a fault in the entertainment cabling network, where paired cable is used, can be difficult to trace. Some faults may be not at all apparent and yet can have an adverse affect on the programme quality throughout the network. The engineer should satisfy himself/herself that the quality of programme reception at each outlet point is to the specified standard.

Television aerial distribution

2.29 Where television sets are provided as a bedhead service it is usual to install an aerial socket for each set connected to a distribution system fed by a single aerial array and a series of signal amplifiers as necessary.

2.30 As recommended by the supplier, the signal levels for both inputs and outputs of the launch amplifier and any repeat amplifiers should be measured and recorded. Where provided, attenuators should be adjusted to achieve the correct signal level and balance from the amplifier outputs.

2.31 The signal level at each TV aerial point should be measured and recorded. Picture quality should also be checked at each point to ensure satisfactory reception.

2.32 The recorded signal levels for the aerial distribution system should take the form of a checklist, a copy of which should be returned to the supplier for retention in the contract file.

Telephones

2.33 An installed telephone system should be tested and commissioned by the specialist supplier (refer to HTM 2055 – 'Telecommunications: telephone exchanges').

Piped medical gases

2.34 The piped medical gas system must be tested and commissioned by the specialist contractor to HTM 2022 – 'Medical gas pipeline systems'. The bedhead services engineer should satisfy himself/herself that the piped medical gas system installation, where it comes into close proximity to bedhead services, or where there is a sharing of common trunking, does not in any adverse way affect the working or servicing of the bedhead services. Segregation of the medical gas services from other services could have some distinct advantages.

This is a complex area and due co-ordination is required between installer of bedhead services system (electrical) and the medical gas installer. This is not required if the bedhead service is pre-wired and pre-piped.

2.35 The bedhead services engineer should check that where medical gas terminal units are installed in the same enclosure/trunking as the bedhead services equipment, there is no impediment to the correct working of the terminal units due to such faults as misalignment of panels/chassis etc.

Low voltage services

2.36 The installation of low voltage (mains) supply for power, lighting and to such points as bedhead services power units is usually the responsibility of the main electrical contractor, who would have complied with the current IEE Wiring Regulations (BS7671:1992 'Requirements for Electrical Regulations').

2.37 The engineer should satisfy himself/herself that the LV components associated with the bedhead services are properly connected and in good working order. It is recommended that essential and non-essential services are identified along with circuit designations at the bedhead units for low voltage terminal points.

Batteries

2.38 With call systems generally being powered from the LV essential supply, it is uncommon to specify the use of battery/charger equipment. Where such equipment is installed it is important to observe the manufacturer's recommendations with regard to siting, charging and discharging. An appropriate load should be applied to the batteries to confirm that they will support the specified call system load for the specified time period.

Witness testing and handover

2.39 The stage or stages at which the client or his representative will wish to witness the testing of part or the whole of the system should be agreed prior to the bedhead services engineer commissioning his site work.

2.40 At the conclusion of the witness testing and the final acceptance by the client or their representative of any adjustments or re-work found to be necessary, the engineer will arrange to provide the client with any documentation pertinent to the contract which is requested.

2.41 A commissioning certificate should be presented to the client or their representative for signing by both parties. A copy will be retained by both parties.

Sample checklists

Bedhead services

Bedhead Services Checklist	Completed	
Ward/Area	Incomplete	
Supplier	Sheet of	
Contractor	Pc address – file	

Location	Activity	Witnessed		
		Cont'r	HCP	Date

WITNESSED	CONTRACTOR	HCP	DATE
Print name and sign			

SAMPLE

Figure 1

Television reception

TELEVISION RECEPTION CHECKLIST					Completed		
Ward/Area					Incomplete		
Supplier					Sheet of		
Contractor					Pc address – file		
Location	Microvolts	Picture Quality	Sound Quality	Channel Sequence	Witnessed		
					Cont'r	HCP	Date

WITNESSED	CONTRACTOR	HCP	DATE
Print name and sign			

SAMPLE

Figure 2

3.0 OPERATIONAL MANAGEMENT

Maintenance

General

3.1 Responsible management will recognise that an adequate policy on maintenance contributes to good housekeeping.

3.2 Regular inspection and replacement or repair of the bedhead services equipment when necessary will ensure a smoother operation of the healthcare activities and an easier life for patients and staff.

3.3 Where medical gas pipeline equipment is installed, maintenance to HTM 2022 – 'Medical gas pipeline systems' should be strictly applied, and carried out by specialists.

3.4 Where the LV and ELV bedhead services are basic and the healthcare premises have a sufficiently competent engineering department, management may consider that adequate maintenance can be carried out by in-house staff.

3.5 Modern installations are most likely to incorporate communication systems using sophisticated electronic techniques and in these cases it is essential that servicing and maintenance is assigned to the manufacturer, supplier or other qualified and competent agency.

3.6 All suppliers of equipment and contractors used for on-site services should be Quality Assured to BS EN ISO 9000 or equivalent.

Voltage supplies

3.7 Voltage supplies within bedhead services will normally consist of 240V (LV) for socket-outlets and lighting circuits and 24V (Extra Low Voltage – ELV) nominal for call systems. These two classes of voltage will be segregated as per the IEE Wiring Regulations to maintain safety.

3.8 Part of the LV circuits should be connected to the essential supply to allow continuity of services during failure of the public power supply.

3.9 The ELV voltage will be derived from a power supply installed locally to the ward. This unit should also be connected to the essential supply via a fused connection point.

3.10 Checking of voltages on specialised equipment should be limited to the applied 240V and to the LV supply to call systems, measured at the power supply unit. Where recommended by the supplier, other voltages can be measured at various points on the call system to aid fault-finding.

Radio/television

3.11 The temptation for engineering staff may well be to treat any deterioration of radio/TV facilities at the bedhead as a low priority. Operational managers should adopt a positive approach and institute routine checks that satisfactory entertainment is received at all reception points.

3.12 Where there are signs that a television picture is below standard, the signal voltage should be measured at the wall socket with a signal strength meter. Generally a reading of 60 dB (1 mV) is considered acceptable.

Call systems

3.13 It is recommended that full testing of the call systems is carried out at regular intervals. The following checks are typical:

a. for normal calls – all appropriate lamps illuminate steadily;

b. for emergency calls – all appropriate lamps illuminate while flashing;

c. unplug handset and/or call only unit to check for call;

d. tones operate for 1 second on/9 seconds off for normal calls;

e. tones operate for 0.5 seconds on/0.5 seconds off for emergency calls;

f. all entertainment channels operate satisfactory;

g. headphones are clean and serviceable;

h. bedlights operate via panel switch and handset.

3.14 It should be possible to energise 25% of the patient call system and then raise a further call. If this is not possible, it could indicate that the power supply unit is under capacity or an auto cut-out has operated prematurely.

Batteries

3.15 With call systems generally being powered from the LV essential supply, it is uncommon to find systems being supplied from battery/charger equipment. Where such equipment is installed, regular maintenance of the batteries is all-important. The amount of attention needed will be dependent on the degree of sophistication of the charger and the type of battery employed. The supplier's instructions on charging and discharging should be closely followed. Adequate ventilation is paramount.

3.16 Systems using microprocessors may well have internal long-life cells to maintain certain electronic functions during any power loss. Such cells will have a finite life, and the supplier's instructions regarding their timely replacement should be observed.

3.17 Where a personal attack alarm is installed and staff are provided with body-worn transmitter units, these will be battery powered with either primary cells or rechargeable cells. The supplier's instructions regarding battery life should be followed. It is recommended that each member of staff equipped with a transmitter should carry out a functional test to a purpose-installed test receiver at the point of issue, prior to commencement of their daily tour of duty.

3.18 Where a pocket paging system is installed to alert nursing staff to a patient or emergency call, the body-worn receiver units will be powered by primary cells or rechargeable cells. The supplier's instructions regarding battery life should be followed. It is recommended that each member of staff equipped with a receiver should carry out a functional test prior to their daily tour of duty.

Spares

3.19 The degree to which spare parts need to be kept on site will be influenced by the type of system, the size of system, and the body responsible for service and maintenance.

3.20 The supplier should, on request, supply a list of recommended items to be kept on site.

3.21 With patient-associated items such as handsets, call only units and headsets, which can easily become damaged or just suffer from fair wear and tear, it is recommended that a small quantity of spares be maintained on site. Experience will determine the necessary quantity.

3.22 Where the specialist supplier is responsible for service and maintenance, they may request a secure area for the storing of general spares and/or parts pertinent to that site; this should not be discouraged.

Tools

3.23 Where site staff may at times need access to bedhead services equipment such as trunking, and special tools are therefore required, suitable tools should be kept available.

3.24 Instrumentation acquired by management to check, maintain or adjust system functions (including software-controlled variables) should be kept secure and in good condition. Calibration of such instruments should be carried out at the prescribed intervals.

Instructions

3.25 It is essential that nursing staff are made fully aware of the operation of the various bedhead services. It should be a contractual requirement that the supplier provides instruction, preferably within the healthcare premises following handover.

3.26 Whether or not maintenance will be carried out by the supplier or the healthcare premises engineering staff, the supplier should be prepared to instruct such staff on the engineering principles employed either at the supplier's establishment or on the healthcare premises.

Documentation

3.27 A complete set of documents relating to the contract should be retained by the supplier and by the client to include the following:

a. as-fitted drawings (if appropriate);

b. wiring diagrams;

c. checklist covering all items of equipment in the contract;

d. software programming details;

e. any special instructions;

f. operation manual;

g. maintenance/servicing manual.

It is strongly recommended that a set of any documents required to carry out servicing or maintenance be kept on site in a secure place and that this place is made known to whoever is responsible for carrying out the work.

HTM 2020 – 'Electrical safety code for low voltage systems'; HTM 2007 – 'Electrical services: supply and distribution'; and HBN/SHPN 48 refer.

3.28 Whoever has responsibility for maintenance or subsequent modification of the bedhead services systems, should ensure that documentation is kept up-to-date at all times.

Records

3.29 It is recommended that a logbook is kept by operational managers and an entry made of all faults developed and work done on the bedhead services equipment.

3.30 Operational managers are advised to keep records of:

a. the programme of regular maintenance;

b. results of day-to-day planned and unplanned maintenance;

c. reported faults and action taken;

d. usage and stocks of essential spares;

e. names, addresses and telephone numbers of specialist suppliers and approved external service agencies;

f. training details of the healthcare premises engineering staff.

Electrostatic discharges

Refer to the following: HTM 2014 – 'Abatement of electrical interference'; HTM 1 – 'Anti-static precautions: rubber, plastics and fabrics' (currently out of print); Report of Working Party to Review the Anti-Static Requirements for Anaesthetising Areas (Medical Devices Directorate (now Agency), 1990).

3.31 The use of polymeric materials for clothing and bedclothes can give rise to the generation of very high electrostatic charges at the bed. If this is discharged to earth through electronic equipment not designed to withstand this level of static discharge, serious damage can result.

3.32 One measure to combat the build-up of the static field is to use dissipative materials for the floor covering and bed tyres. Where carpets contribute to static problems, cleaning with anti-static fluid can be effective.

3.33 Wherever static protection measures have been undertaken, it is important that these are rigorously maintained.

3.34 Maintenance staff should be made fully aware of the need to handle static sensitive modules correctly. The use of an earthed wrist strap at all times when handling is essential.

4.0 Definitions

4.1 Injury – death or personal injury from electric shock, electrical burn, electrical explosion or arcing, or from fire/explosion initiated by electrical energy or misuse/faults with medical gas supplies.

4.2 System (electrical) – a system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, including such source and such equipment.

4.3 System (communication) – a system designed to provide transfer of information between two or more locations, either by direct wiring or by other means. The system will embrace the necessary control units and power supplies.

4.4 System (medical gas pipeline) – a system designed to provide medical gases, medical compressed air and vacuum, derived from plantroom, compound and/or manifold rooms and including all associated peripheral equipment such as regulators, area valves, alarm and control systems.

4.5 Low voltage (LV) – the existence of a potential difference (rms value for a.c.) normally not exceeding 1000 volts a.c. or 1500 volts d.c. between circuit conductors, or 600 volts a.c. or 900 volts d.c. between circuit conductors and earth.

This definition for low voltage incorporates the extra low voltage (ELV) range as defined in BS7671:1992 'Requirements for Electrical Installations' (the IEE Wiring Regulations, 16th edition)

4.6 Protective extra low voltage (PELV) – The existence of a potential difference (rms value for a.c.) normally not exceeding 25 volts a.c. or 60 volts ripple-free d.c. between circuit conductors or between conductors and earth. The installation requirements for PELV systems are specified in BS7671:1992 'Requirements for Electrical Installations' (the IEE Wiring Regulations, 16th edition, 1995 version).

Bedhead services systems should have one side of the d.c. voltage earthed at the power/control unit only. It is recommended that the remainder of the system wiring be free from any earth connection. A reduced potential difference of 30 volts peak between points is recommended for hand-held call units.

4.7 Essential circuits – circuits of the essential services electrical supply so arranged that they can be supplied separately from the remainder of the electrical installation.

4.8 Bedhead services – facilities provided for patients and/or staff to enable the performance of medical and surgical functions and entertainment. They comprise a fixed installation behind, to the side of or above the bed, and can also embrace other areas of the ward. They can consist of low voltage electrical supplies, extra low voltage communication systems, entertainment, monitoring facilities and medical gas outlets.

4.9 Light emitting diode (LED) – a robust solid-state indicator lamp with indefinite life ideal for low-powered visual display and signalling use.

4.10 Electromagnetic compatibility – capability of electronic equipment or systems to be operated with a defined margin of safety, in the intended operational environment, at designed levels of efficiency, without degradation due to interference.

4.11 Monitored call circuit – the call system will register a call if the hand unit connector to the bedhead or wall-mounted panel is withdrawn or an open circuit cable fault occurs.

4.12 Simplex – a speech system where the nurse station unit has a push-to-speak switch, which is held down while speaking and released for listening. The operation at the bedhead is "hands-free".

4.13 Duplex – a speech system which is "hands-free" at both ends, that is, at both the nurse station and the bedhead.

Other publications in this series

(Given below are details of all Health Technical Memoranda available from HMSO. HTMs marked (*) are currently being revised, those marked (†) are out of print. Some HTMs in preparation at the time of publication of this HTM are also listed.)

1 Anti-static precautions: rubber, plastics and fabrics†
2 Anti-static precautions: flooring in anaesthetising areas (and data processing rooms), 1977.
3 –
4 –
5 Steam boiler plant instrumentation†
6 Protection of condensate systems: filming amines†
2007 Electrical services: supply and distribution, 1993.
8 –
9 Pneumatic conveyor systems*
2010 Sterilizers, 1994.
2011 Emergency electrical services, 1993.
12 –
13 –
2014 Abatement of electrical interference, 1993.
16 –
17 Health building engineering installations: commissioning and associated activities, 1978.
18 Facsimile telegraphy: possible applications in DGHs†
19 Facsimile telegraphy: the transmission of pathology reports within a hospital – a case study†
2020 Electrical safety code for low voltage systems, 1993.
Pack of rulebooks, logbooks, permits etc, 1994.
2021 Electrical safety code for high voltage systems, 1994.
Pack of rulebooks, logbooks, permits etc, 1994.
2022 Medical gas pipeline systems, 1994.
2023 Access and accommodation for engineering services*
2025 Ventilation in healthcare premises, 1994.
26 Commissioning of oil, gas and dual fired boilers: with notes on design, operation and maintenance†
27 Hot and cold water supply, storage and mains services*
28 to 39 –
2040 The control of legionellae in healthcare premises – a code of practice, 1993.
41 to 49 –
2050 Risk assessment in the NHS estate, 1994.
51 to 53 –
2055 Telecommunications (telephone exchanges), 1994.

Component Data Base (HTMs 54 to 80)

54.1 User manual, 1993.
55 Windows, 1989.
56 Partitions, 1989.
57 Internal glazing, 1994.
58 Internal doorsets, 1989.
59 Ironmongery†
60 Ceilings, 1989.
61 Flooring*
62 Demountable storage systems, 1989.
63 Fitted storage systems, 1989.
64 Sanitary assemblies*
65 Health signs*
66 Cubicle curtain track, 1989.
67 Laboratory fitting-out system, 1993.
68 Ducts and panel assemblies, 1993.
69 Protection, 1993.
70 Fixings, 1993.
71 Materials management modular system*
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Firecode

81 Firecode: fire precautions in new hospitals*
81 Supp 1 1993.
82 Firecode: alarm and detection systems, 1989.
83 Fire safety in healthcare premises: general fire precautions, 1994.
85 Firecode: fire precautions in existing hospitals, 1994.
86 Firecode: fire risk assessment in hospitals, 1994.
87 Firecode: textiles and furniture, 1993.
88 Fire safety in health care premises: guide to fire precautions in NHS housing in the community for mentally handicapped/ill people, 1986.

New HTMs in preparation

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2030 Washers for sterile production

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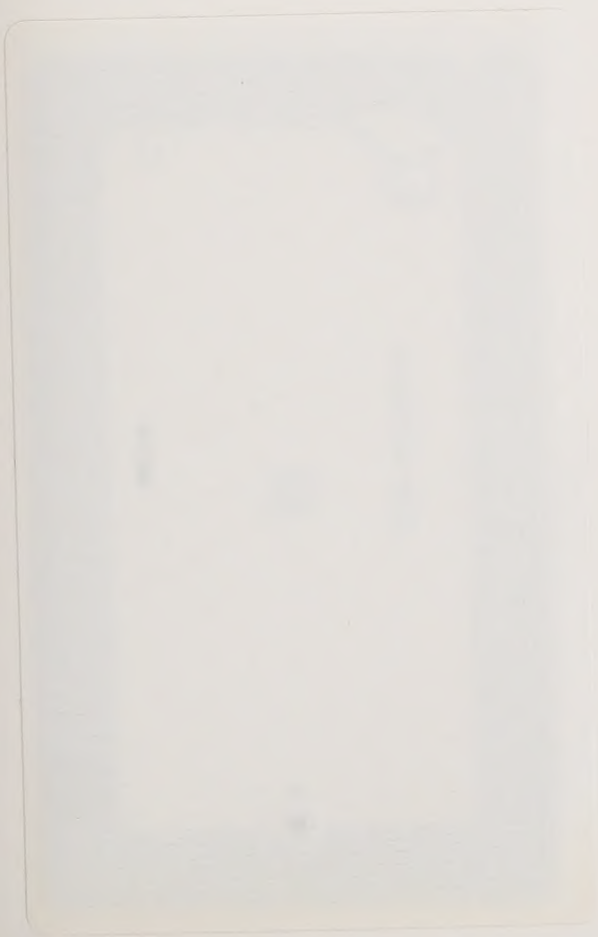

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